N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V_{DSS}	I_D	$R_{DS(ON)}$ (mW) TYP
30V	30A	11.5 @ V_{GS} = 10V
		17 @ V_{GS} = 4.5V

FEATURES

- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- TO-252 and TO-251 Package.

SDU SERIES
TO-252AA(D-PAK)

SDD SERIES
TO-251(I-PAK)
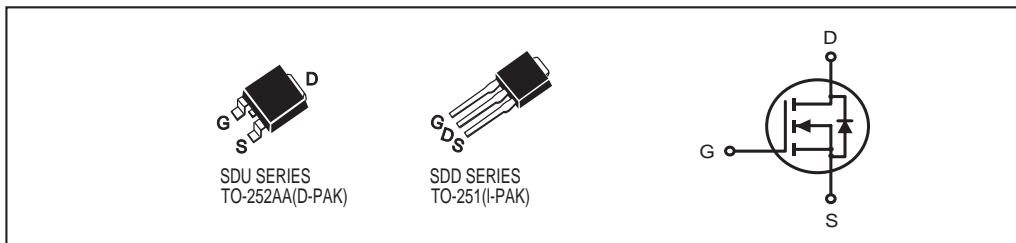
ABSOLUTE MAXIMUM RATINGS (T_C=25 ℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous @T_J=125℃	I_D	30	A
-Pulsed [a]	I_{DM}	90	A
Drain-Source Diode Forward Current	I_S	30	A
Maximum Power Dissipation @T_C=25℃	P_D	50	W
Derate above 25℃		0.3	W/ ˚C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 175	˚C

THERMAL CHARACTERISTICS			
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3	˚C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	˚C/W

SDU/D30N03L

ELECTRICAL CHARACTERISTICS ($T_C=25\ ^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V$, $I_D = 250uA$	30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 24V$, $V_{GS} = 0V$			10	uA
Gate-Body Leakage	I_{GSS}	$V_{GS} = +/-20V$, $V_{DS} = 0V$			+/-100	nA
ON CHARACTERISTICS[a]						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250uA$	1	1.5	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V$, $I_D =15A$		11.5	14	m ohm
		$V_{GS} = 4.5V$, $I_D = 12A$		17	21	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS} = 10V$, $V_{GS} = 10V$	40			A
Forward Transconductance	g_{FS}	$V_{DS} = 10V$, $I_D = 20A$	30			S
DYNAMIC CHARACTERISTICS[b]						
Input Capacitance	C_{ISS}	$V_{DD} =15V$, $V_{GS} = 0V$ $f = 1.0MHz$		1200		pF
Output Capacitance	C_{OSS}			530		pF
Reverse Transfer Capacitance	C_{RSS}			150		pF
SWITCHING CHARACTERISTICS[b]						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 15V$, $I_D =1A$, $V_{GS} = 10V$, $R_{GEN} = 6$ ohm		5		ns
Rise Time	t_r			65		ns
Turn-Off Delay Time	$t_{D(OFF)}$			67		ns
Fall time	t_f			90		ns
Total Gate Charge	Q_g	$V_{DS} = 15V$, $I_D = 15A$, $V_{GS} =10V$		34.4		nC
Gate-Source Charge	Q_{gs}			5.1		nC
Gate-Drain Charge	Q_{gd}			7.7		nC

ELECTRICAL CHARACTERISTICS (Tc=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS [a]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, Is = 25A			1.3	V

Notes

a.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
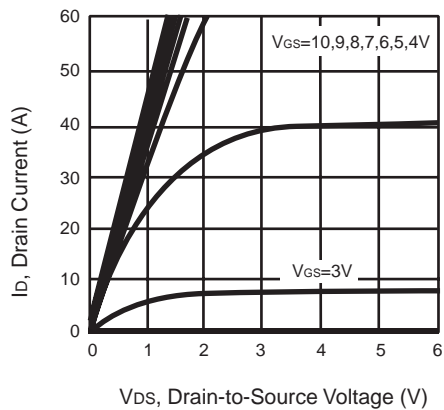
b.Guaranteed by design, not subject to production testing.
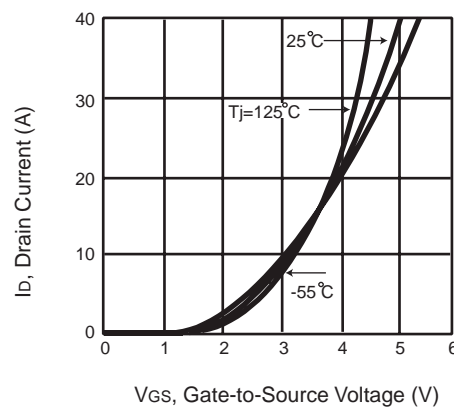

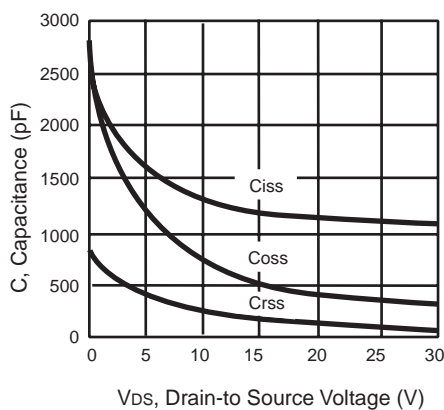Figure 1. Output Characteristics

Figure 2. Transfer Characteristics

Figure 3. Capacitance
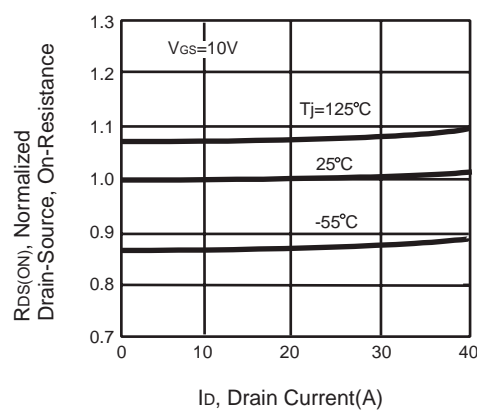
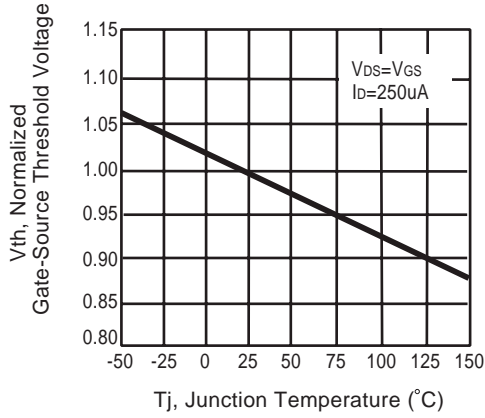Figure 4. On-Resistance Variation with Drain Current and Temperature

SDU/D30N03L
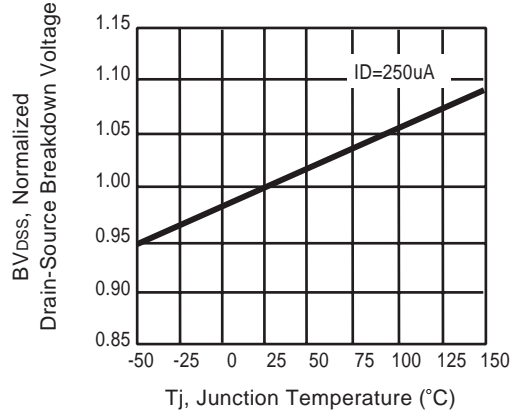

Figure 5. Gate Threshold Variation
with Temperature

$V_{DS}=V_{GS}$
$I_D=250uA$

Vth, Normalized Gate-Source Threshold Voltage

Tj, Junction Temperature ($^{\circ}$C)

Figure 6. Breakdown Voltage Variation
with Temperature

ID=250uA

BV$_{DSS}$, Normalized Drain-Source Breakdown Voltage

Tj, Junction Temperature ($^{\circ}$C)
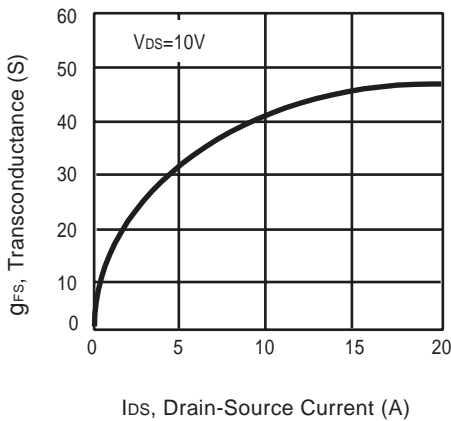
Figure 7. Transconductance Variation
with Drain Current

$V_{DS}=10V$

g$_{FS}$, Transconductance (S)

I$_{DS}$, Drain-Source Current (A)
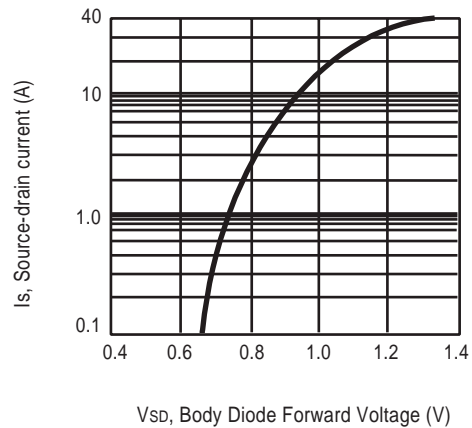
Figure 8. Body Diode Forward Voltage
Variation with Source Current

I$_S$, Source-drain current (A)

V$_{SD}$, Body Diode Forward Voltage (V)

Figure 9. Gate Charge

$V_{DS}=15V$
$I_D=20A$

V$_{GS}$, Gate to Source Voltage (V)

Qg, Total Gate Charge (nC)
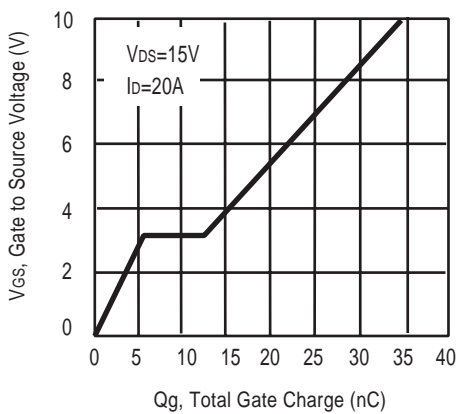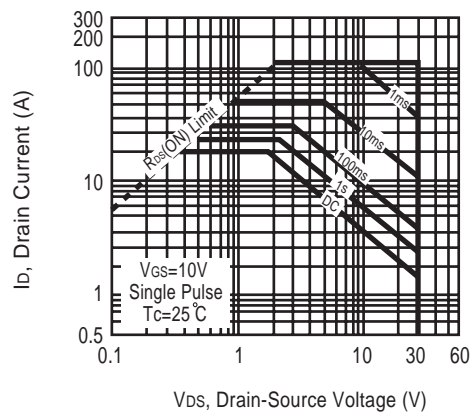
Figure 10. Maximum Safe
Operating Area

R$_{DS(ON)}$ Limit
1ms
10ms
100ms
1s
DC

V$_{GS}$=10V
Single Pulse
Tc=25°C

I$_D$, Drain Current (A)
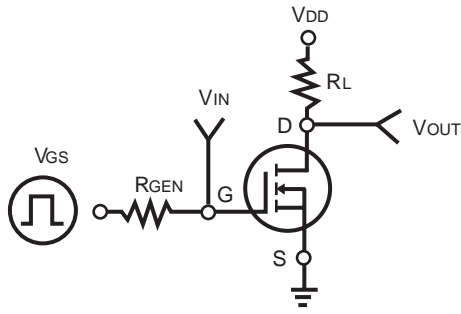
V$_{DS}$, Drain-Source Voltage (V)
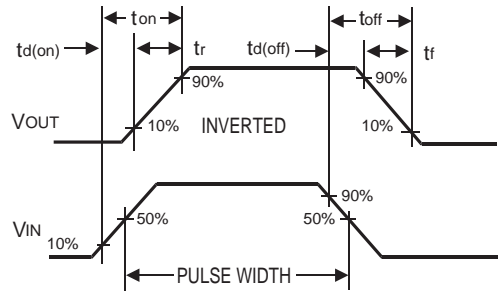
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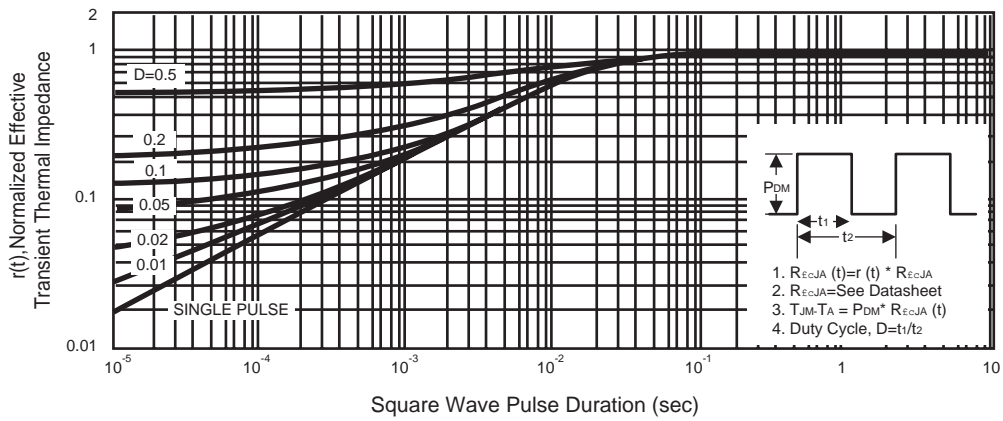Figure 11. Switching Test Circuit

Figure 12. Switching Waveforms

Figure 13. Normalized Thermal Transient Impedance Curve